AMENDMENT

In the Claims:

Please amend claims 1-6, 9-10, 13-14, 19-24, 27-28 and 31-33 as shown below, and withdraw claims 15-18, and 34-37 without prejudice or disclaimer.

1. (Currently amended) An apparatus for processing a differential first pulse amplitude modulated (PAM) signal ~~(P1)~~ having a time varying magnitude representing a sequence of integer-valued first data elements ~~(D1)~~, the apparatus comprising:

amplifying means ~~(70)~~ for amplifying the first PAM signal with an adjustable first gain ~~(G1)~~ to produce a second PAM signal ~~(P2)~~;

digitizing means ~~(72)~~ for processing the second PAM signal to generate a sequence of second data elements ~~(D2)~~ having values representing magnitudes of the second PAM signal at a succession of times; and

first automatic gain control (AGC) means ~~(66)~~ for determining a number of second data elements generated per unit of time having values within a first range and for adjusting the first gain when the determined number falls outside a second range.

2. (Currently amended) The apparatus in accordance with claim 1, wherein the first AGC means comprises:

first means for generating a seventh data ~~(D7)~~ of value representing a count of second data elements within a succession of N data elements having values falling within the first range, where N is an integer greater than 1, and

second means for adjusting the first gain when the value of the seventh data falls outside the second range.

3. (Currently amended) The apparatus in accordance with claim 2, wherein the first means comprises:

means ~~(90,92)~~ for generating a sixth data ~~(D6)~~ in response to each second data element, the sixth data being of value indicating whether an absolute value of the second data element resides within the first range;

a first counter ~~(94)~~ receiving the sixth data, for altering the value of the seventh data ~~(D7)~~ in response to each pulse of a periodic clock signal (CLK) depending on whether the sixth data is of value indicating that the absolute value of the second data element resides within the first range, and for setting the value of the seventh data to zero upon receipt of each pulse of a first control signal ~~(C1)~~; and

means ~~(95)~~ for supplying a pulse of the first control signal to the first counter in response to every Nth pulse of the clock signal.

4. (Currently amended) The apparatus in accordance with claim 2, wherein the second means comprises:

a slicer for generating eighth data ~~(D8)~~ in response to the seventh data of value indicating whether the value of the seventh data resides above, below or within the second range; and

means ~~(97)~~ for altering the first gain in response to the value of the eighth data.

5. (Currently amended) The apparatus in accordance with claim 1, further comprising:

digital signal processing (DSP) means ~~(74)~~ for processing the second data elements to produce a sequence of third data elements ~~(D3)~~, each having a real number value that is substantially proportional to a product of the integer value of a corresponding one of the first data elements and a second gain ~~(G2)~~;

slicer means ~~(78)~~ for processing the third data elements to produce a sequence of fourth data elements ~~(D4)~~, wherein each fourth data element has an integer value approximating a value of a corresponding one of the third data elements; and

second AGC means ~~(68)~~ for controlling the second gain in response to a comparison of values of corresponding third and fourth data elements.

6. (Currently amended) The apparatus in accordance with claim 5, wherein the second AGC means comprises:

means ~~(102)~~ for generating tenth data ~~(D10)~~ in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

means ~~(100,104)~~ for generating eleventh data ~~(D11)~~ in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data indicates whether a difference in values between the third data elements and its corresponding fourth data element is zero, higher than zero, or lower than zero;

counter means ~~(106,108)~~ for adjusting a value of thirteenth data ~~(D13)~~ in response with a combination of values of the tenth data and the eleventh data; and

second gain control means ~~(110,112,114,116,118)~~ for adjusting the second gain in response to the thirteenth data.

7. (Original) The apparatus in accordance with claim 6 wherein the second gain control means alters the second gain when the value of the thirteenth data goes outside predetermined limits.

8. (Original) The apparatus in accordance with claim 7 wherein the second gain control means also signals the counter means to set the value of the thirteenth data to zero when the value of the thirteenth data goes outside the predetermined limits.

9. (Currently amended) An apparatus for processing a differential first pulse amplitude modulated (PAM) signal ~~(P1)~~ having a time varying magnitude representing a sequence of integer-valued first data elements ~~(D1)~~, the apparatus comprising:

amplifying means ~~(70)~~ for amplifying the first PAM signal with an adjustable first gain ~~(G1)~~ to produce a second PAM signal ~~(P2)~~;

digitizing means ~~(72)~~ for processing the second PAM signal to generate a sequence of second data elements ~~(D2)~~ having values representing magnitudes of the second PAM signal at a succession of times;

first means ~~(90,92,94)~~ for generating seventh data ~~(D7)~~ of value representing a number of second data elements within a succession of N data elements having values falling within a first range, where N is an integer greater than 1, and

second means ~~(95,96,97)~~ for adjusting the first gain when the value of the seventh data falls outside a second range;

digital signal processing (DSP) means ~~(74)~~ for processing the second data elements to produce a sequence of third data elements ~~(D3)~~, each having a real number value that is substantially proportional to a product of the integer value of a corresponding one of the first data elements and a second gain ~~(G2)~~;

slicer means ~~(78)~~ for processing the third data elements to produce a sequence of fourth data elements ~~(D4)~~, wherein each fourth data element has an integer value approximating a value of a corresponding one of the third data elements; and

second AGC means ~~(68)~~ for controlling the second gain in response to a comparison of values of corresponding third and fourth data elements.

10. (Currently amended) The apparatus in accordance with claim 9, wherein the second AGC means comprises:

means ~~(102)~~ for generating tenth data ~~(D10)~~ in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

means ~~(100,104)~~ for generating eleventh data ~~(D11)~~ in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data indicates whether a difference in values between the third data element and its corresponding fourth data element is zero, higher than zero, or lower than zero;

means ~~(106,108)~~ for adjusting a value of thirteenth data ~~(D13)~~ in response to a combination of values of the tenth data and the eleventh data; and

second gain control means ~~(110,112,114,116,118)~~ for adjusting the second gain in response to the thirteenth data.

11. (Original) The apparatus in accordance with claim 10 wherein the second gain control means alters the second gain when the value of the thirteenth data goes outside predetermined limits.

12. (Original) The apparatus in accordance with claim 11 wherein the second gain control means also signals the counter means to set the value of the thirteenth data to zero when the value of the thirteenth data goes outside the predetermined limits.

13. (Currently amended) The apparatus in accordance with claim 9, wherein the first means comprises:

means ~~(90,92)~~ for generating sixth data ~~(D6)~~ in response to each second data element, the sixth data being of value indicating whether an absolute value of the second data element resides within the first range;

a first counter ~~(94)~~ receiving the sixth data, for altering the value of the seventh data ~~(D7)~~ in response to each pulse of a periodic clock signal (CLK) depending on whether the sixth data is of value indicating that the absolute value of the second data element resides within the first range, and for setting the value of the seventh data to zero upon receipt of each pulse of a first control signal ~~(C1)~~; and

means ~~(95)~~ for supplying a pulse of the first control signal to the first counter in response to every Nth pulse of the clock signal.

14. (Currently amended) The apparatus in accordance with claim 13, wherein the second means comprises:

a slicer for generating eighth data ~~(D8)~~ in response to the seventh data of value indicating whether the value of the seventh data resides above, below or within the second range; and

means ~~(97)~~ for altering the first gain in response to the value of the eighth data.

15. (Withdrawn) An apparatus for controlling a gain of a digital signal processor producing a sequence of third data elements (D3) having values that are a product of values of elements of an input sequence and said gain, the apparatus comprising:

slicer means (78) for processing the third sequence to produce a sequence of fourth data elements (D4), wherein each fourth data element has an integer value approximating a value of a corresponding one of the third data elements; and

an automatic gain controller (68) for controlling the second gain in response to a difference in values of corresponding the third and fourth data elements.

16. (Withdrawn) The apparatus in accordance with claim 15 wherein the automatic gain controller comprises:

means (102) for generating tenth data (D10) in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

means (100,104) for generating eleventh data (D11) in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data indicates whether a difference in values between the third data element and its corresponding fourth data element is zero, higher than zero, or lower than zero;

means (106,108) for adjusting a value of thirteenth data (D13) in response with a combination of values of the tenth data and the eleventh data; and

gain control means (110,112,114,116,118) for adjusting the gain in response to the thirteenth data.

17. (Withdrawn) The apparatus in accordance with claim 16 wherein the gain control means alters the second gain when the value of the thirteenth data goes outside predetermined limits.

18. (Withdrawn) The apparatus in accordance with claim 17 wherein the gain control means also signals the counter means to set the value of the thirteenth data to zero when the value if the thirteenth data goes outside the predetermined limits.

19. (Currently amended) A method for processing a differential first pulse amplitude modulated (PAM) signal ~~(P1)~~ having a time varying magnitude representing a sequence of integer-valued first date elements ~~(D1)~~, the method comprising the steps of:

a. amplifying the first PAM signal with an adjustable first gain ~~(G1)~~ to produce a second PAM signal ~~(P2)~~;

b. digitizing the second PAM signal to generate a sequence of second data elements ~~(D2)~~ having values representing magnitudes of the second PAM signal at a succession of times; and

c. processing the second data elements to determine a number of second data elements generated per unit time falling within a first range and adjusting the first gain when the determined number falls outside a second range.

20. (Currently amended) The method in accordance with claim 19, wherein step c comprises the substeps of:

c1. generating a seventh data ~~(D7)~~ of value representing a count of a number of second data elements within a succession of N data elements having values falling within the first range, where N is an integer greater than 1, and

c2. adjusting the first gain when the value of the seventh data falls outside the second range.

21. (Currently amended) The method in accordance with claim 20, wherein step c1 comprises the substeps of:

c11. generating a pulse of a first control signal ~~(C1)~~ in response to every Nth pulse of a periodic clock signal (CLK)[[.]];

c12. generating sixth data ~~(D6)~~ in response to each second data element, the sixth data being of value indicating whether an absolute value of the second data element resides within the first range; and

c13. altering the value of the seventh data ~~(D7)~~ in response to each pulse of the periodic clock signal (CLK) depending on whether the sixth data is of value indicating that the absolute value of the second data element resides within the first range, and

c14. setting the value of the seventh data to zero on each pulse of the first control signal.

22. (Currently amended) The method in accordance with claim 20, wherein step c further comprising the substeps of:

c3. generating eighth data ~~(D8)~~ in response to the seventh data of value indicating whether the value of the seventh data resides above, below or within the second range; and

c4. altering the first gain in response to the value of the eighth data.

23. (Currently amended) The method in accordance with claim 19, further comprising the steps of:

e. processing the second data elements with a second gain ~~(G2)~~ to produce a sequence of third data elements ~~(D3)~~, each having a real number value that is substantially proportional to a product of the integer value of a corresponding one of the first data elements and a second gain ~~(G2)~~;

f. processing the third data elements to produce a sequence of fourth data elements ~~(D4)~~, wherein each fourth data element has an integer value approximating a value of a corresponding one of the third data elements; and

g. controlling the second gain in response to a comparison of values of corresponding elements of the third and fourth data elements.

24. (Currently amended) The method in accordance with claim 23, wherein step g comprises the substeps of:

g1. generating tenth data ~~(D10)~~ in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

g2. generating eleventh data ~~(D11)~~ in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data indicates whether a difference in values between the third data element and its corresponding fourth data element is zero, higher than zero, or lower than zero;

g3. adjusting a value of thirteenth data ~~(D13)~~ in response with a combination of values of the tenth data and the eleventh data; and

g4. adjusting the second gain in response to the thirteenth data.

25. (Original) The method in accordance with claim 24 wherein the second gain is altered when the value of the thirteenth data goes outside predetermined limits.

26. (Original) The method in accordance with claim 25 wherein step g further comprises the substep of:

g5. setting the value of the thirteenth data to zero when the value thirteenth data goes outside the predetermined limits.

27. (Currently amended) A method for processing a differential first pulse amplitude modulated (PAM) signal ~~(P1)~~ having a time varying magnitude representing a

sequence of integer-valued first data elements ~~(D1)~~, the method comprising the steps of:

a. amplifying the first PAM signal with an adjustable first gain ~~(G1)~~ to produce a second PAM signal ~~(P2)~~;

b. digitizing the second PAM signal to produce a sequence of second data elements ~~(D2)~~ representing magnitudes of the second PAM signal at a succession of times;

c. generating seventh data ~~(D7)~~ of value representing a count of a number of second data elements within a succession of N data elements having values falling within the first range, where N is an integer greater than 1;

d. adjusting the first gain when the value of the seventh data falls outside the second range;

e. processing the second data elements to produce a sequence of third date elements ~~(D3)~~, each having a real number value that is substantially proportional to a product of the integer value of a corresponding one of the first data elements and a second gain ~~(G2)~~;

f. processing the third data elements to produce a sequence of fourth data elements ~~(D4)~~, wherein each fourth data element has an integer value approximating a value of a corresponding one of the third data elements; and

g. controlling the second gain in response to a comparison of values of corresponding third and fourth data elements.

28. (Currently amended) The method in accordance with claim 27, wherein step g comprises the substeps of:

g1. generating tenth data ~~(D10)~~ in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

g2. generating eleventh data ~~(D11)~~ in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data

indicates whether a difference in values between the third data element and its corresponding fourth data element is zero, higher than zero, or lower than zero;

g3. adjusting a value of thirteenth data ~~(D13)~~ in response to a combination of values of the tenth data and the eleventh data; and

g4. adjusting the second gain in response to the thirteenth data.

29. (Original) the method in accordance with claim 28 wherein the second gain is adjusted at step g4 when the value of the thirteenth data goes outside predetermined limits.

30. (Original) The method in accordance with claim 29 wherein step g further comprises the substep of:

g5. setting the value of the thirteenth data to zero when the value of the thirteenth data goes outside the predetermined limits.

31. (Currently amended) The method in accordance with claim 27, further comprising the steps of:

h. generating seventh data ~~(D7)~~ of value representing a count of a number of second data elements within a succession of N data elements having values falling within the first range, where N is an integer greater than 1; and

i. adjusting the first gain when the value of the seventh data falls out side the second range.

32. (Currently amended) The method in accordance with claim 31, wherein step h compress the substeps of:

h1. generating sixth data ~~(D6)~~ in response to each second data element, the sixth data being of value indicating whether an absolute value of the second data element resides within the first range;

h2. altering the value of the seventh data ~~(D7)~~ in response to each pulse of a periodic clock signal (CLK) depending on whether the sixth data is of value indicating that the absolute value of the second data element resides within the first range, and

h3. setting the value of the seventh data to zero in response to every Nth pulse of the clock signal.

33. (Currently amended) The method in accordance with claim 32, wherein step h3 comprises the substeps of:

h31. generating eighth data ~~(D8)~~ in response to the seventh data of value indicating whether the value of the seventh data resides above, below or within the second range; and

h32. altering the first gain in response to the value of the eighth data.

34. (Withdrawn) A method for controlling a gain of a digital signal processing circuit producing a sequence of third data elements (D3) of values that are a product of values of elements of an input sequence and the gain, the method comprising the steps of:

a. processing the third data elements to produce a sequence of fourth data elements (D4), wherein each fourth data elements has an integer value approximating a value of a corresponding one of the third data elements; and

b. controlling the gain in response to a sign of a difference between each third data element and its corresponding fourth data element and a signal of each fourth data element.

35. (Withdrawn) The method in accordance with claim 34 wherein step b comprises the substeps of:

b1. generating tenth data (D10) in response to each fourth data element, wherein a value of the tenth data indicates whether a value of the fourth data element is zero, higher than zero, or lower than zero;

c1. generating eleventh data (D11) in response to each third data element and its corresponding fourth data element, wherein a value of the eleventh data indicates whether a difference in values between the third data element and its corresponding fourth data element is zero, higher than zero, or lower than zero;

b3. adjusting a value of thirteenth data (D13) in response with a combination of values of the tenth data and the eleventh data generated in response to each third data element and its corresponding fourth data element, and

b4. adjusting the gain in response to the thirteenth data.

36. (Withdrawn) The method in accordance with claim 35 wherein the gain is altered at step b4 whenever the value of the thirteenth data goes outside predetermined limits.

37. (Withdrawn) The method in accordance with claim 36 wherein step b further comprises the substep of:

b5. setting the value of the thirteenth data to zero when the value thirteenth data goes outside the predetermined limits.